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Acute Coronary Syndromes

IMMORTALIZED MOUSE ADIPOSE STEM CELL LINES RETAIN STEM CELL PROPERTIES IN A LONG-TERM CULTURE AND IMPROVE FUNCTION OF INFARCTED RAT HEARTS

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Background: Adipose-derived stem cells (ADSCs) have the potential to differentiate into various cell lineages and the source to easily obtain from patients, and therefore they are promising candidates for cell therapy. However, a drawback is their limited life span during in vitro culture. In this study, mouse ADSC lines were immortalized, and their stem cell properties were evaluated in vitro and by transplantation into myocardial infarction rats.

Methods: ADSCs isolated from adult ICR mice were infected with retroviruses harboring the with human telomerase reverse transcriptase (hTERT)-IRES eGFP genes. Mouse ADSC lines were selected on the basis of their morphology, eGFP expression and high levels of hTERT activity, and their phenotypic characteristics and differentiation potential were evaluated. Cardiac function were analyzed by echocardiography at 1 day, 1 week, 2 weeks and 4 weeks after 5 X 105 cells per rat (n=15) were transplanted.

Results: The two hTERT-immortalized ADSC lines derived from a single cell were finally selected. They were positive for CD29, CD44, CD106 and Sca-1 but were negative for CD14, CD31, CD45, CD71, CD90 and CD117. Interestingly, the one ADSC line was negative for CD34 whereas the other one was positive for CD34. Two ADSC line showed ability to proliferate for more than a year in culture. They retained multi-potential differentiating into cardiomyocytes, endothelial cells, adipocytes and osteocytes, but the CD34- ADSC line exhibited higher levels of adipogenic and osteogenic differentiation potential compared to the the CD34+ ADSC line. Moreover, two ADSC lines showed significantly higher adipogenic or osteogenic differentiation potential compared to that of primary ADSCs. Significant improvements in ejection fraction value were observed in the CD34+ ADSC- and CD34- ADSC-transplanted group compared to the control group at 4 week.

Conclusions: The hTERT-immortalized ADSC lines are very useful for the study of stem cell differentiation as well as for cell therapy in cardiovascular field.